VM SDI Digital Series

1U Analog/Digital Audio Monitors
(VMSDA-1 and VMMDA-1)

Document P/N **821625** Rev-**A**

with One SDI or SDI *and* HD-SDI Input and Re-clocked Output on BNC, One AES input on BNC or Phoenix, Analog input on "mini" Phoenix, SDI Group Eight Channel Pair selection, Stereo Analog Output of Selected Source on "mini" Phoenix, Two 10-Segment Level Meters, and Phase Indication

User Manual

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Important Safety Instructions

1) Read these instructions.
2) Keep these instructions.
3) Heed all warnings.
4) Follow all instructions.
5) Do not use this apparatus near water.
6) Clean only with dry cloth.
7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8) Do not install near any heat source such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10) Protect the power cord from being walked on or pinched, particularly at plugs convenience receptacles and the point where they exit from the apparatus.
11) Only use attachments/accessories specified by the manufacturer.
12) Use only with the cart stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13) Unplug this apparatus during lightning storms or when unused for long periods of time.
14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15) Do not expose this apparatus to rain or moisture.
16) The apparatus shall be connected to a mains socket outlet with a protective earthing connection.

CAUTION!

In products featuring an audio amplifier and speakers, the surface at the side of the unit, where the audio amplifier heat sink is internally attached, may get very hot after extended operation. When operating the unit excercise caution when touching this surface and ensure that external materials which may be adversely affected by heat are not in contact with it. There is a Hot Surface label (see diagram) attached to the aforementioned surface of the product.

Introduction

Congratulations on your selection of a Wohler Technologies product. We are confident it represents the best performance and value available, and we guarantee your satisfaction with it.

If you have questions or comments you may contact us at:

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Section 1

General Features, Specifications, and Installation

Description

Features

Applications

General Specifications

Installation

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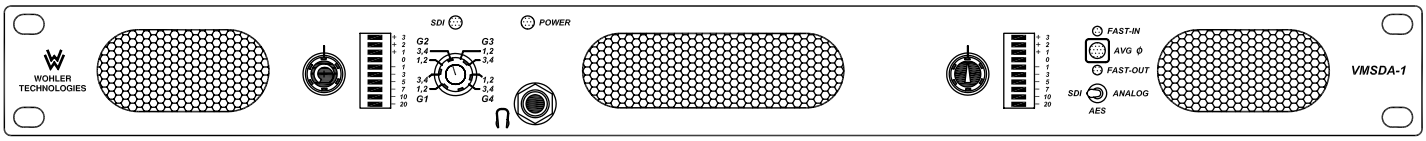
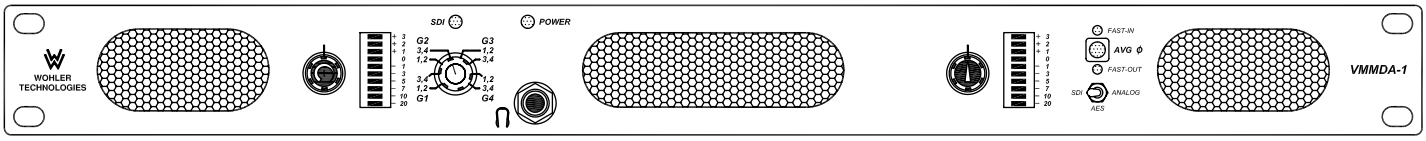
VM SDI Digital Series

Analog/Digital Audio Monitors

Models: VMSDA-1 and VMMDA-1



VMSDA-1 Front Panel



VMMDA-1 Front Panel

Description

The single-rackspace **VM SDI Digital Series** audio monitors permit stereo monitoring with excellent fidelity exceeding that of ordinary monitors. In this series the **VMSDA-1** monitors analog, AES, and standard SDI audio sources while the **VMMDA-1**can monitor analog, AES, standard SDI, *or* HD-SDI audio sources.

A 3-position toggle switch on the front panel selects between the three input sources (analog, AES, or SDI). When SDI is selected as the source, an 8-position rotary SDI Group Select switch selects which of the eight SDI channel pairs will be monitored. An LED above the SDI Group Select switch indicates the "lock" status of the SDI source.

Both models feature dual 10-segment LED bargaph meters that provide visual indication of input levels. Other front panel features include volume and balance controls, power indication LED, headphone output, and phase indication LEDs. Wohler Technologies proprietary three-LED stereo phase indication feature allows monitoring of phase relationships of the selected stereo inputs.Volume and balance controls are standard, but can be reconfigured as A volume/B volume via an internal jumper. Two front-firing midrange-tweeter speakers and a compact high-performance woofer are arranged in Wohler Technologies' popular bi-amp design. The summed bass feature is important for audible detection of "out of phase" conditions. Speaker amp limiters prevent accidental damage to speakers from high input levels.

The rear panel features an SDI input and output on BNC connectors, an AES input on a BNC and Phoenix connector, two analog inputs on Phoenix connectors, and an analog stereo output of the selected source on Phoenix connectors.

Features

- Only one rack space high, but produces a powerful 96 dB SPL @ 2 feet
- VMSDA-1 model monitors analog, AES, and SD-SDI audio sources
- VMMDA-1 model monitors analog, AES, and SD-SDI *or* HD-SDI audio sources
- Source selected using a front panel 3-position toggle switch (analog, AES, or SDI)
- Eight channel pairs from SDI Groups 1-4 selectable with front panel rotary switch (when SDI is the selected source)
- LED indicates SDI "lock" status
- Two 10-segment LED bargraph audio level meters
- Phase indication LEDs
- Power indication LED
- Volume and Balance controls (jumper-configurable as A-volume/B-volume)
- Headphone jack
- Two analog inputs on Phoenix connectors
- AES input on balanced Phoenix connector and unbalanced BNC connector
- Selectable termination on AES input
- SDI input and re-clocked output on BNC connectors
- Balanced stereo analog output of selected source on Phoenix connectors
- Thoroughly magnetically shielded
- Internal universal AC mains power supply

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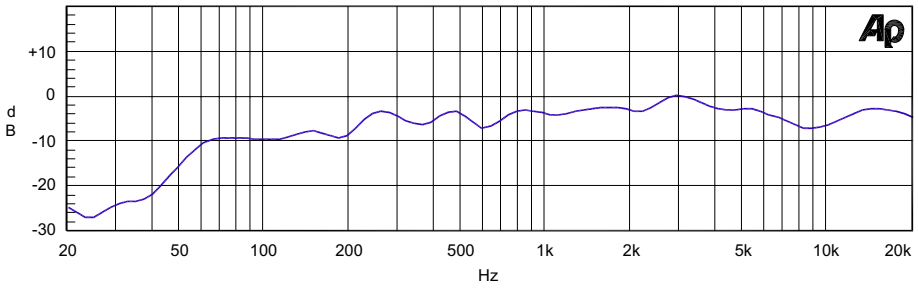
Applications

The **VM SDI Digital Series** of audio monitors are ideally suited to provide high quality analog/digital audio monitoring in a very compact form. Ideal for use in VTR bays, mobile production vehicles, teleconferencing installations, multimedia systems, satellite links, cable TV facilities, and on-air radio studios, both models are manufactured in the U.S.A. and are backed by a strong warranty and a satisfaction guaranteed return policy.

General Specifications

Peak Acoustic Output: (@ 2 ft.)	96 dB SPL
Input Level for Full Output (Volume Full On):	**Analog:** 0 dBv balanced **Digital:** 20 dBfs
Acoustic Distortion:	Typically < 2% at any level below limiting, 100Hz-15KHz
Acoustic Frequency Response:	60 Hz to 16 kHz (± 6dB)
Hum and Noise, Analog:	Better than -70 dB below full output
Electrical Distortion:	> 0.3% at any level below limit threshold
Input Connectors:	**Analog:** "mini" Phoenix (bal). x 2 **AES:** "mini" Phoenix x1, BNC x 1 **SDI/HD-SDI:** BNC x 1
Output Connectors:	**Analog (Selected):** "mini" Phoenix x 2 **SDI (re-clocked):** BNC x 1
Analog Input Impedance:	>100k Ω, balanced

AES Input Impedance:	75 and 110 Ω termselect
AES Input Sampling Rate:	32-48k Hz, auto-sensing
SDI Input Sampling Rate:	48k Hz
Level Meter Type:	LED bargraph
Bargraph Quantity:	10-segment
LED Color:	Tri-color (red, amber, green)
Metering Range:	23 dB
Magnetic Shielding:	Less than 0.2 gauss any adjacent surface
Power Supply:	Internal universal AC input (100-240V)
Chassis Dimensions (H x W x D):	1.75 x 19 x 10 in. (44.5 x 483 x 254 mm.)
Weight:	6.8 lbs. (3.1kg)



Typical 1/6 Octave Audio Response Curve

Units are certified to meet, at time of manufacture, all currently applicable product safety and EMC requirements, such as those of CE. 0 dbV ref. 0.775V RMS. Features and specifications subject to improvement without notice.

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Installation

Mounting

The unit should be mounted where convenient for operating persons, ideally at approximately ear level for best high frequency response. Its superior magnetic shielding eliminates concerns about locating it adjacent to most types of CRT monitors, including even high-resolution color monitors.

Heat Dissipation

Heat dissipated by the speaker amps is conducted directly to the left side of the chassis; no special considerations for cooling are necessary as long as the ambient temperature inside the rack area does not exceed approximately 40°C (104°F).

Sympathetic Vibration

Sympathetic vibration from other equipment (cables, etc.,) in the rack may be serious enough to interfere with the unit's sound quality out in the listening area. The use of thin card stock and/or felt or foam weather-stripping type materials between adjacent vibrating surfaces, or tying up loose cables, etc., may be required to stop vibrations external to the unit.

Mechanical Bracing

The chassis is securely attached to the front panel at eight points along its surface, not just at the four corners of the chassis ears. This feature will reduce or eliminate rear bracing requirements in many mobile/portable applications. The weight of internal components is distributed fairly evenly around the unit.

Audio Connections

Connection of the audio feeds is straightforward. See the Rear Panel Features section on page **10** and the interconnect block diagram on page **12** for information about audio connections.

Electrical Interference

Care should be exercised to avoid mismatched cable types and other similar causes of undesired reflections in digital signal systems. If severe enough, such reflections can result in corruption of the digital datastream.

AC Power

The unit's AC mains connection is via a standard IEC inlet, with safety ground connected directly to the unit's chassis. The universal AC input (100-240VAC, 50/60Hz) switching power supply is a self-resetting sealed type, with automatic over-voltage and over-current shutdown. There is no user-replaceable fuse in either the primary or secondary circuit.

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Section 2

Operation

Front Panel Features

Rear Panel Features

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Front Panel Features

Please refer to **Figure-2a** on the facing page to familiarize yourself with the front panel features of the **VM SDI Digital Series** units. The following sections describe these features and are referenced, by number, to **Figure-2a**. Note that even though only the **VMMDA-1** front panel is shown, features and operation are identicle for the **VMSDA-1**.

1 Speakers (Left, Right, and Woofer)

The **VM SDI Digital Series** audio monitors feature two mid-range speakers (left and right) and one woofer speaker. See page **12** for a description and diagram of the audio amplifier and speaker configuration.

2 Volume Control

This adjusts the loudness of the audio reproduced by the internal speaker channels or connected headphone.

3 Audio Level Meter Bargraphs (Left and Right)

Audio levels for the selected source channels (left and right) are displayed via these two 10-segment LED bargraph audio level meters. Meters have a dynamic range of 23 dB and levels are displayed using both VU and PPM dynamics.

4 SDI Lock Status LED

This LED indicates the lock status of the **SDI** source signal. It glows GREEN to indicate a *locked* **SDI** signal and is unlit to indicate an *unlocked* **SDI** signal (or that no **SDI** source is connected). This LED indicates **SDI** lock status continuosly regardless of any other selection settings.

5 SDI Group Channel Select Switch

This 8-position rotary switch selects one of the eight channel pairs (from **SDI Groups 1-4**) that will be monitored from the connected **SDI** source. Note that in order to audibly monitor the selected **SDI** channel pair, the **Source Select Switch** (**Item 10**) must be set to **SDI**.

6 Headphone Jack

This jack accepts the standard 1/4” phone type stereo plug. Select the headphone audio sources as you would for the internal speakers. When you plug in headphones the speakers will mute.

7 Power Indication LED

This LED glows GREEN to indicate the unit is connected to mains power and an operation voltage is present.

8 Balance Control

This control adjusts the volume balance between the left and right speaker channels. See page **12** for a description of the balance control characteristics within the amplifier and speaker configuration.

9 Phase Indication LEDs

These three LEDs indicate the instantaneous and average phase (polarity) conditions between the two signals in the channel pair assigned to the left and right speaker channels. The two smaller LEDs labeled **FAST** show *instantaneous* phase relationships in the signal. The larger LED labeled **AVG** will indicate the *average* phase condition. Indication is as follows:

- The ***left*** **FAST** LED glows (or blinks) GREEN for ***in-phase*** signals.
- The ***right*** **FAST** LED glows (or blinks) AMBER for ***out-of-phase*** signals.
- The large **AVG** LED indicates the *average* phase condition by glowing GREEN for ***in-phase*** signals, or RED for ***out-of-phase*** signals.

In general, observing the **AVG** LED alone is sufficient for proper phase monitoring. While it is normal for stereo signals to contain some intermittant instantaneous *out-of-phase* and *in-phase* conditions (**FAST** LEDs), a steady RED glow of the **AVG** LED indicates an *out-of-phase* alarm condition.

10 Source Select Switch

This 3-position toggle switch selects the source to be monitored through the unit (**SDI**, **AES**, or **analog**).

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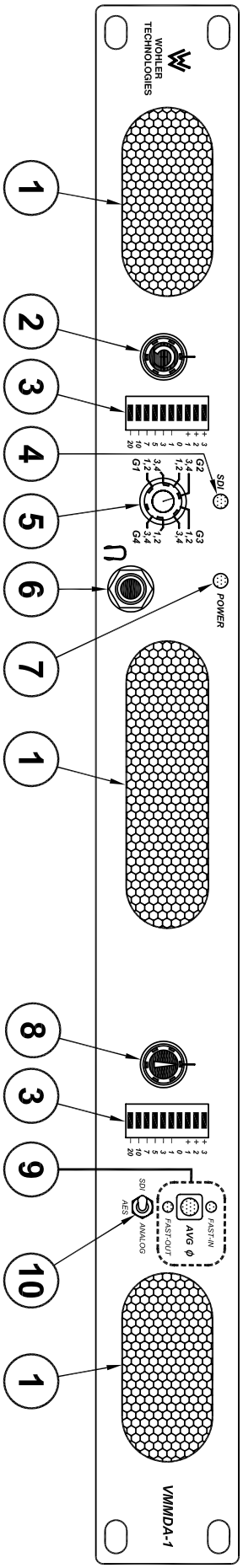

Figure-2a: Front Panel Features

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Rear Panel Features

Please refer to **Figure-2b** on the facing page to familiarize yourself with the rear panel features of the **VM SDI Digital Series** units. The following sections describe these features and are referenced, by letter, to **Figure-2b**.

A Power Connector

Attach the supplied IEC-320 power cord between this connector and mains power.

B SDI Input Connector

This BNC input connector (**SDI IN**) is configured for unbalanced, **75 Ω** impedance connections. In the **VMSDA-1** model, this input accepts standard **SDI** formatted digital signals. In the **VMMDA-1** model, this input accepts *either* standard **SDI** *or* **HD-SDI** (high-definition **SDI**) formatted digital signals. To monitor the digital source signals entering this input connector, set the **Source Select Switch** (**Item 10**, page **8**) to **SDI**.

Note: The **SDI Lock Status LED** (**Item 4**, page **8**) will continue to indicate **SDI** lock status for this input even when the **SDI** source is *not* selected for monitoring.

C SDI Output Connector

This BNC connector (**SDI OUT**) outputs a reclocked (regenerated) copy of the signal entering the **SDI Input Connector** (**Item B**).

D Analog Output Connector (Left and Right)

This "mini" Phoenix style (Mini-Combicon) dual vertical, 6-position terminal block connector outputs an **analog** signal of the source currently selected for monitoring. When the selected source is digital (**AES**, **SDI**, or **HD-SDI**), the unit will automatically de-embed the audio to **analog** for output from this connector. The top three positions are the *left* output; the bottom three positions are the *right* output. Pinout information is silk-screened just below the connector.

E AES Balanced Input

This "mini" Phoenix style (Mini-Combicon) 3-position terminal block connector receives **AES** digital signals and is configured for *balanced* **110 Ω** impedance connections. To monitor the source signals entering this input connector, set the **Source Select Switch** (**Item 10**, page **8**) to **AES**.

Note: There is only *one* **AES** input *channel*; do not connect two **AES** signal sources simultaneously to both the balanced and unbalanced AES input *connectors*. Only one **AES** input connector (balanced *or* unbalanced) should be used at a time.

F AES Unbalanced Input

This female BNC connector receives **AES** digital signals and is configured for *unbalanced* **75 Ω** impedance connections. To monitor the digital source signals entering this input connector, set the **Source Select Switch** (**Item 10**, page **8**) to **AES**.

Note: There is only *one* **AES** input *channel*; do not connect two **AES** signal sources simultaneously to both the balanced and unbalanced AES input *connectors*. Only one **AES** input connector (balanced *or* unbalanced) should be used at a time.

G AES Termination DIP Module

This 2-position DIP switch module is used to set the termination characteristics for the **AES** input channel (both balanced and unbalanced). In the event that the **AES** input channel is fed to downstream equipment, DIP switch section **1** (*left*-side switch) should be placed in the UP (unterminated) position. If there are *no* downstream connections, then DIP switch section **1** should be placed in the DOWN (terminated) position. **Note:** Section **2** of the DIP module is not used.

H Analog Input Connector

This "mini" Phoenix style (Mini-Combicon) dual vertical, 6-position terminal block connector accepts standard **analog** signals and is configured for *balanced* **100k Ω** impedance connections. The top three positions are the *left* output; the bottom three positions are the *right* output. Pinout information is silk-screened just below the connector. To monitor the analog source signals entering this input connector, set the **Source Select Switch** (**Item 10**, page **8**) to **ANALOG**.

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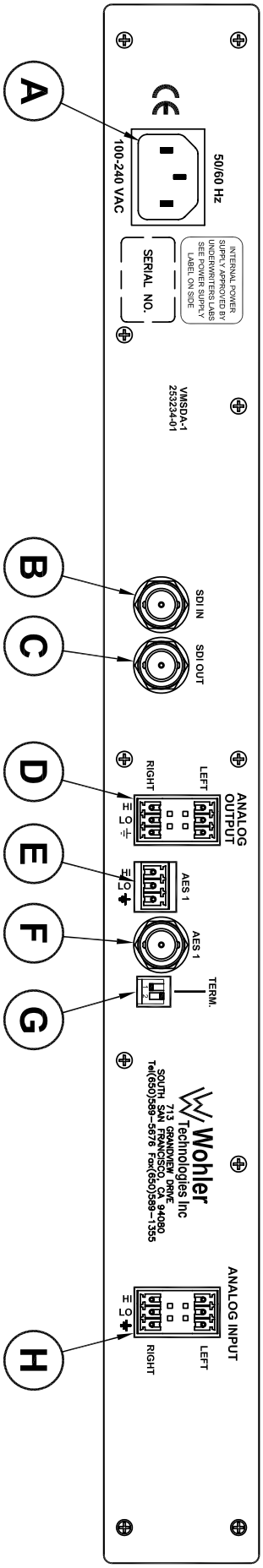

Figure-2b: Rear Panel Features

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Audio Amplifier and Speaker Configuration

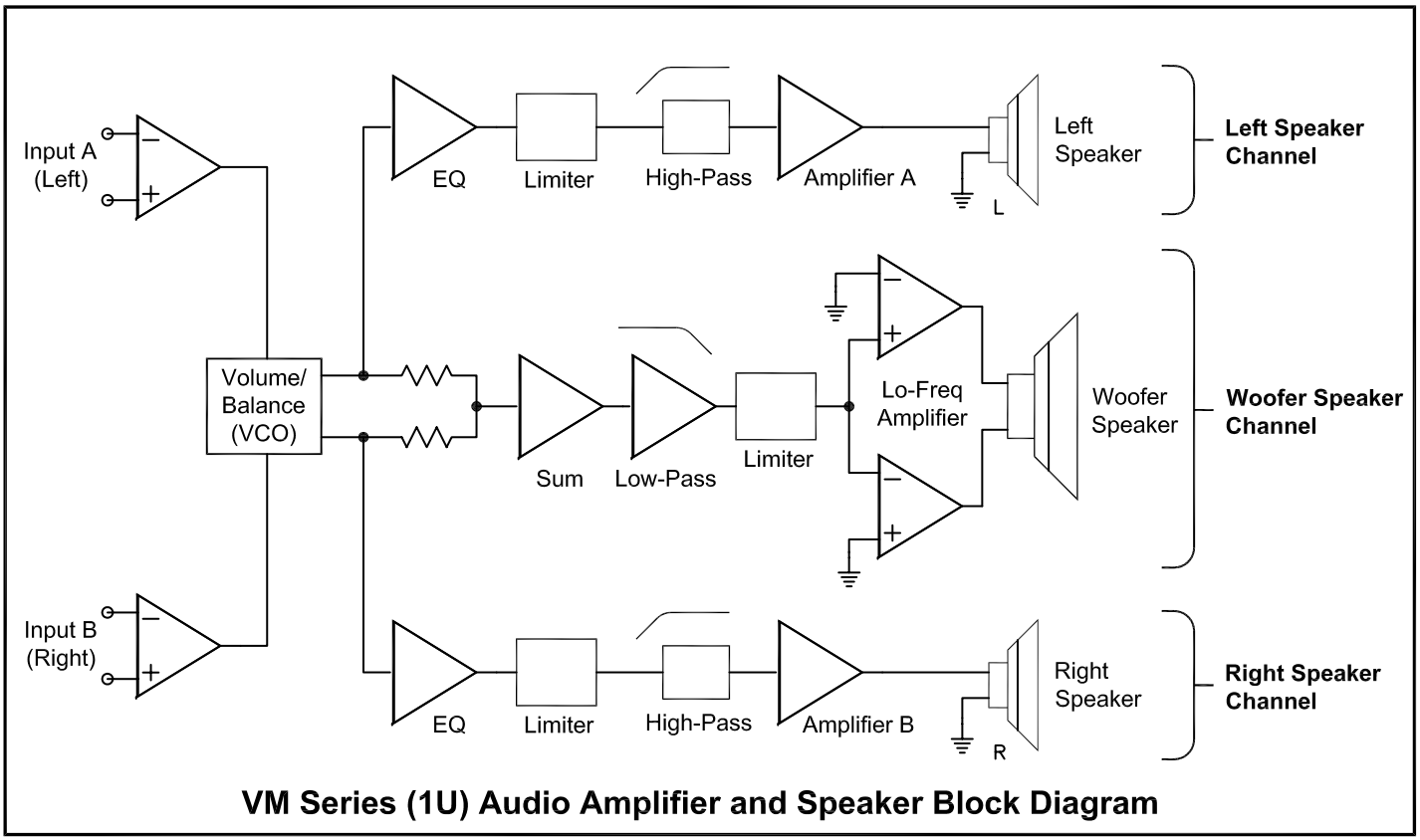
General Description

All models in the **VM Series** contain high performance transducers (speakers) driven by three power amplifiers; two amplifier/driver combinations handle midrange and high frequency information in the left and right (stereo) speaker channels, while the third amplifier channel sums the left and right channel information *below* the 500 Hz crossover point in the woofer (bass) speaker(s). Note that the woofer channel is NOT a dedicated **LFE** (subwoofer) or **Center** channel.

Speaker Configuration

The **VM Series** (1U) products are configured with two speaker channels (left and right) to reproduce midrange and high-range audio frequencies (in stereo) and one woofer speaker channel to reproduce the summed (combined) *low-range* audio frequencies from the left and right speaker input channels.

See below for a simplified diagram of the **VM Series** audio amplifier/speaker configuration.



VM Series (1U) Audio Amplifier and Speaker Block Diagram

Balance Control Characteristics

The balance control attenuates the signal from the source, so that the left and right bass frequencies (summed together and reproduced in the woofer channel) will also respond to the balance control.

Example:
If an audio signal of a voice speaking English is fed to the "A" (left) input and a voice speaking Spanish is fed to the "B" (right) input, then the left speaker channel will reproduce the midrange and high-range frequencies of the English speaking voice, the right speaker channel will reproduce the midrange and high-range frequencies of the Spanish speaking voice, and the woofer speaker channel will reproduce the summed (combined) low-range frequencies of *both* voices.

If the balance control is *panned to the left*, then the Spanish speaking voice in the right speaker channel will diminish in volume, the Spanish speaking voice in the woofer speaker channel will also diminish, and the English speaking voice in both the right speaker channel and woofer speaker channel will increase slightly (to maintain overall output level). The converse is true if the balance control is panned to the right.

See the **VM Series (1U) Audio Amplifier and Speaker Block Diagram** above for placement of the balance control in the audio amplifier circuit.

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Section 3

Technical Information

General Technical Observations

VM Main PCB Trimpot Locations

VM SDI Digital Series Interconnect Block Diagram

NOTE:
PCB layout and schematic support documentation is available upon request.

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General Technical Observations

General Mechanical Observations

Elimination of cabinet and component sympathetic vibrations (resonances) requires considerable attention to mechanical details. Because of this, and the physical constraints of the speakers' acoustic enclosures, even minor changes to any of the mechanical details of the unit can seriously impair its acoustic performance. This especially applies to the speaker mountings. If mechanical work on the unit is necessary, be sure to make adequate notes to permit accurate reassembly.

The proprietary method of magnetic shielding in the 2U models is usually degraded slightly by any disassembly of the unit, except removal of the rear panel. Almost any maintenance or repair will require removal of the cover. If an immediately adjacent video monitor shows magnetic interference after reassembly of the unit, it may have to be returned to the factory to restore the shielding completely.

General Audio Circuitry Observations

Since a single-sided power supply is used, all amplifier sections are "biased" with a 1/2 supply reference, so all opamp signal terminals on the main board should have a DC level of +12V, +/-0.7V. Signal inputs to the main audio board from any of the input select circuits are via the balanced input stage, in lieu of the analog inputs on a basic unit. The signal pick-off for the headphones is after the volume and balance controls. Speaker muting is controlled by circuitry that senses connection of headphones to the jack.

The power amps are attached to an aluminum heatsink plate (which is also connected to the circuit common for these devices). The heatsink plate forms an operational module separate from the chassis, which allows access to the solder side of the circuit board while power is applied to the circuitry. To avoid thermal shutdown of the power amp(s), they should NOT be operated without their tabs being fastened securely to the heatsink plate.

Variations in the frequency response of different production runs of drivers sometimes requires minor adjustments in the equalization/ crossover components in individual runs of units. Some of these components may have values slightly different than those indicated in the schematic, which are the nominal ones. If any of the drivers (speakers) are replaced, it may be helpful to change some of these components to achieve maximum flatness of response.

The operating threshold of the woofer limiter is critical to both satisfactory reproduction of program transients and preventing damage to, or destruction of, the speaker itself. The side speaker output limiter circuits are similarly important, though not as critically adjusted.

The woofer power amps are arranged in a bridge configuration; care must be taken to avoid letting EITHER speaker terminal contact the chassis (common) OR THE GROUNDED LEAD OF ANY TEST EQUIPMENT so as not to short out the power amps. The side speaker outputs are single-ended, so these precautions are not necessary for them.

Level Adjustment

The **VM SDI Digital Series** units are set at the factory for nominal line levels **(digital = +20 dBFS**; **analog = +4 dBU)**. Other line levels require either a custom order or require that the customer adjust the unit. To adjust the unit for the first time, apply a digital signal (test-tone) of the nominal line level. Adjust the trim pots **P5** and **P8** so that the balanced analog output is at the nominal analog line level. Apply a balanced analog signal of the nominal line level, select that signal for monitoring, then adjust the trim pot **P2** and **P3** until the balanced analog output is at the same level as the balanced analog input. Then adjust the trim pots **P6** and **P7** so that the front panel bargraph meters read zero level.

See **Figure-3a** on the facing page for the trim pot locations on the **VM** main PCB (P/N 919141-1).

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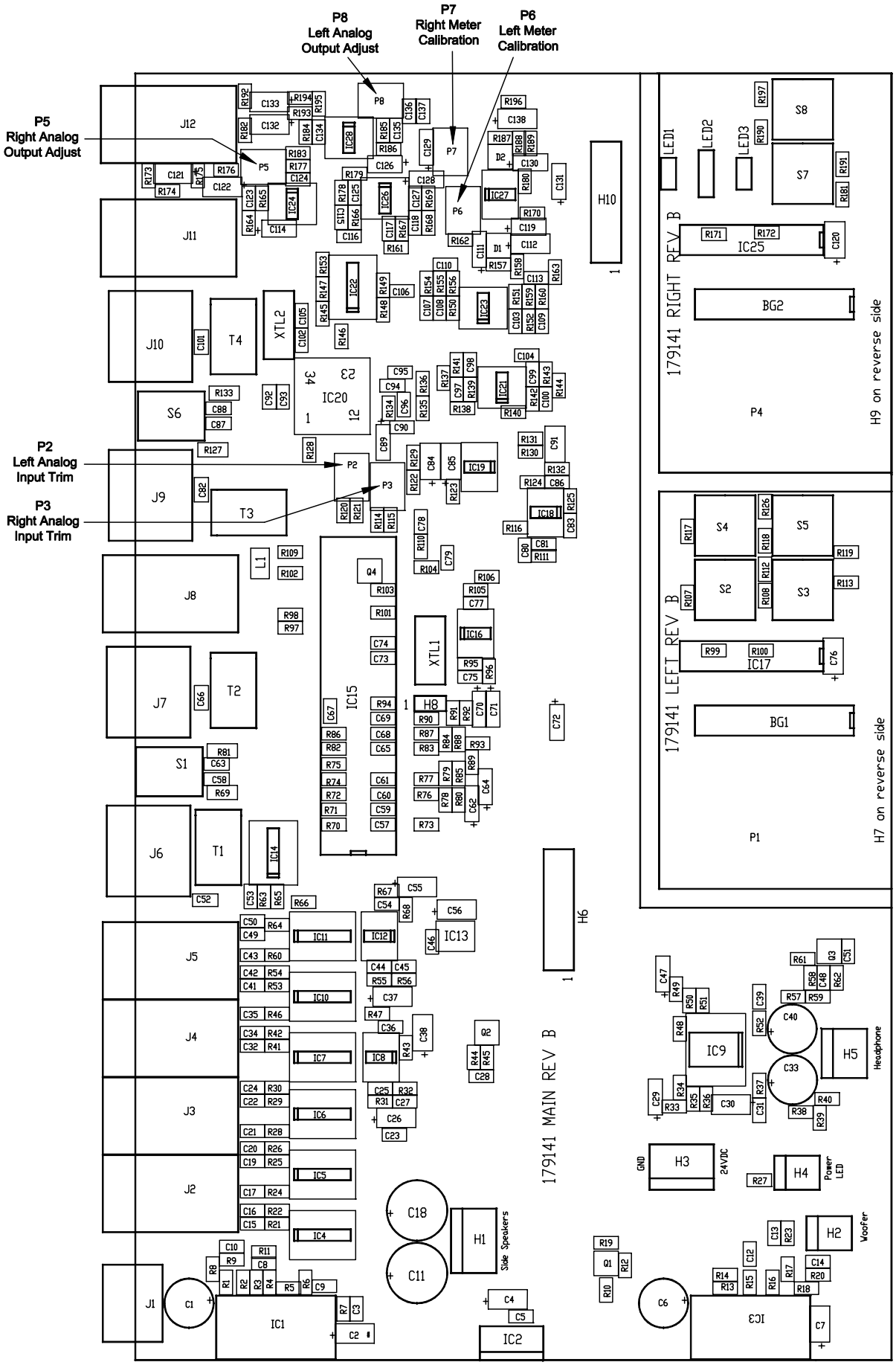
VM Main PCB (P/N 919141-1) Trimpot Locations



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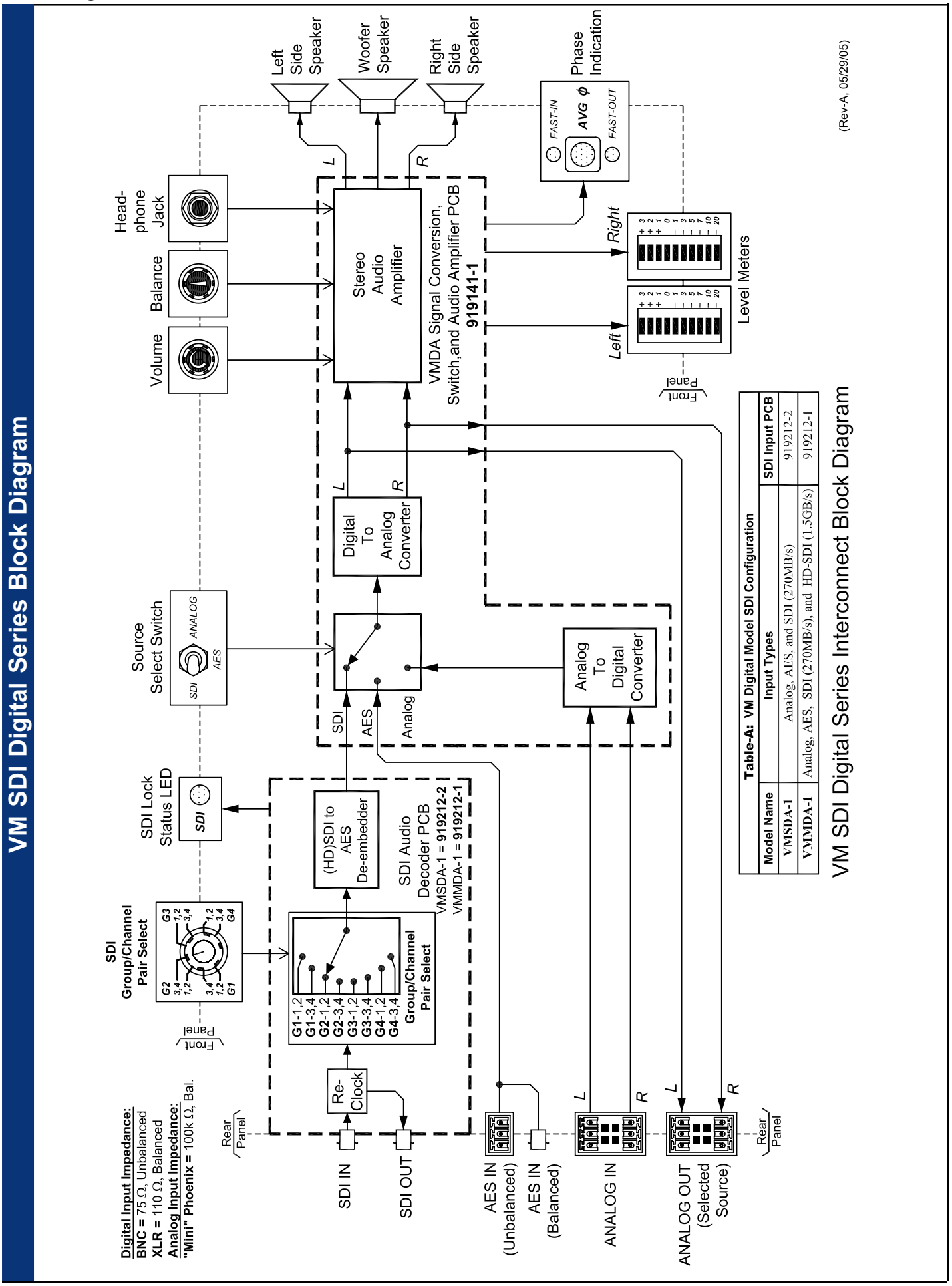

Table-A: VM Digital Model SDI Configuration

Model Name	Input Types	SDI Input PCB
VMSDA-1	Analog, AES, and SDI (270MB/s)	919212-2
VMMDA-1	Analog, AES, SDI (270MB/s), and HD-SDI (1.5GB/s)	919212-1

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NOTES:

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